# RCL Semiconductors Ltd.

C5211

## 3-Second Speech Synthesizer

### GENERAL DESCRIPTION

C5211 is a speech synthesizer CMOS circuit with 6-bit sound quality . Speech data is mask programmable. It can store one sentence of up to 3 seconds at 6KHz sampling frequency. One trigger input is provided and can be mask programed to be edge or level sensitive.

### FEATURES

- 3V - 4.5v power supply.
- Auto power standby .
- Power on reset.
- 3 seconds speech capacity.
  (At 6kHz sampling frequency)
- 6 bit sound quality.
- Built in oscillator, frequency adjusted by external resistor.
- Built in D/A converter with current output
- BUSY output can drive LED.
- Support Cds input trigger.

- Mask programmable options for :
  max. 7 times of repeat
  max 8 pieces of phrase
  max. 8 mutes between phrases whose interval
  is 5 sec in maximum
  2 trigger mode (level / edge trigger)
  Retrigger or non-retrigger function
  BUSY drives LED lighting or blinking during play.

### BLOCK DIAGRAM
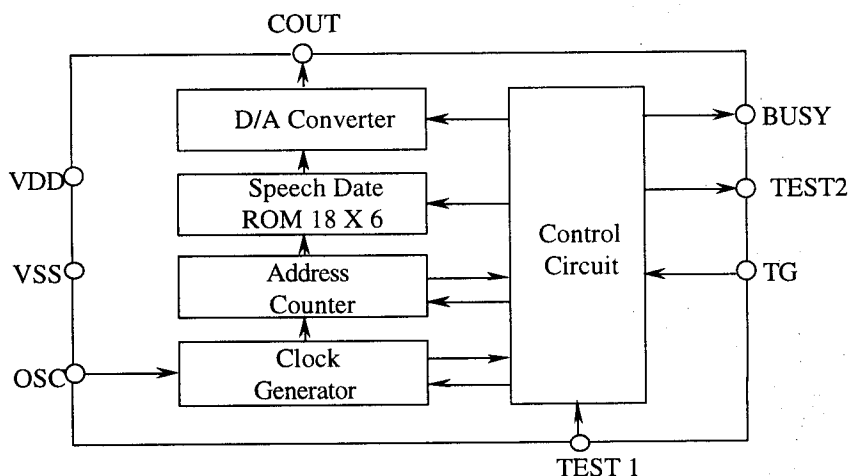


Built in RC oscillator, frequency adjustable by external R.

### PIN DESCRIPTION

| Symbol | Pin | Type | Description |
|--------|-----|------|-------------|
| VDD | 1 | I | Positive power supply. |
| OSC | 2 | I | External R input for adjusting sampling frequency. |
| TEST1 | 3 | I | Test input with built in pull down resistor |
| BUSY | 4 | O | Output = low or pulse during playing speech. |
| TG | 5 | I | Sentence trigger input with built-in pull down resistor. |
| TEST2 | 6 | O | Test output pin |
| COUT | 7 | O | Output to drive speaker |
| VSS | 8 | I | Ground |

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Limits |
|---|---|---|
| Power supply voltage range | Vss-Vdd | -0.3 V to +6.0V |
| Input voltage range | | Vss -0.3 to Vdd +0.3 |
| Operating temperature range | | 0 to +70°C |
| Storage temperature range | | -40 to +125°C |

## DC ELECTRICAL CHARACTERISTICS

Unless otherwise specified, Ta = 25°C, Vdd = 3V, Vss = 0V.

| Characteristics | Symbol | Limits | | | Unit | Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Operating voltage range | Vdd | 2.4 | - | 5.0 | V | - |
| Standby current | Idd1 | - | 0.1 | 1 | µA | I/O open |
| Operation current | Idd2 | - | 64 | 500 | µA | I/O open |
| Input voltage | Vih | 1.5 | 1.9 | 2.5 | V | - |
| (TG) | Vil | -0.3 | 0 | 0.3 | V | - |
| Input current | Iih | - | - | 10 | µA | Vin=3.0V |
| (TG) | Iil | - | - | 0.1 | µA | Vin = 0.4V |
| Output current (COUT) | Icout | - | 3 | - | mA | $V_{cout}$ = 0.6V |
| Output current | Ioh | - | - 1.0 | - | mA | Vout = 2.5V |
| (BUSY) | Iol | - | 5.0 | - | mA | Vout = 0.5V |

## AC ELECTRICAL CHARACTERISTICS

Unless otherwise specified, Ta = 25°C, Vdd = 3V, Vss = 0V.

| Characteristics | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Oscillator frequency | Fosc | - | 1.5 | 10 | MHZ | - |
| Oscillator current (no load) | Iop | - | 0.5 | 0.8 | mA | - |
| Frequency stability * | $\Delta F/F$ | - | - | 5 | % | Rosc=129K |
| Frequency variation with process | $\Delta F/F$ | - | - | 5 | % | Rosc=129K |
| Frequency variation with temperature | $\Delta F/F$ | - | - | 15 | % | Rosc=129K 0 to +70°C |
| Pulse width of Trigger | Ttrigger | - | - | 10 ** | us | - |

Note: *. $\Delta F/F$ = Fosc(3v) - Fosc(2.5V) / Fosc(3V)

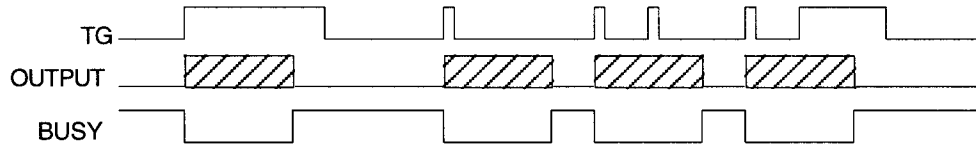## OPERATION

### (1) REPEAT TIMES AND PHRASES

The internal ROM contains one sentence and this sentence can be mask programmed to repeat from 1 to 7 times. Maximum 8 pieces of phrase in one sentence can have more voice combinations.

### (2) TRIGGER MODES

One sentence can be mask programmed to be level or edge trigger.

If non-retrigger function is selected, the sentence once triggered will not be interrupted until the programmed number of times of play is finished; if retrigger function is selected, the setence will be interrupted and play from the very begining when TG key is pressed.
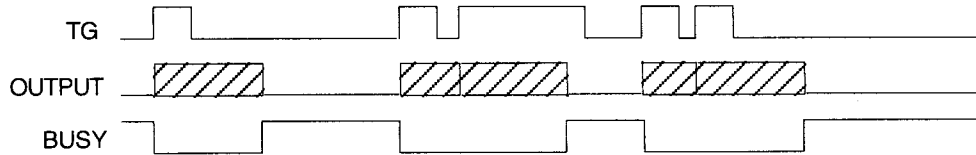
(A) Edge Trigger



(B) Level Trigger
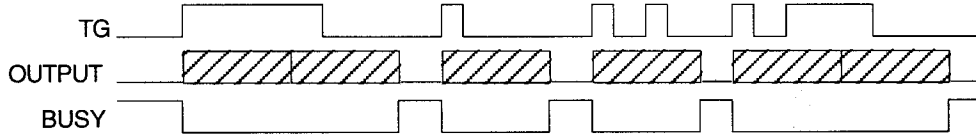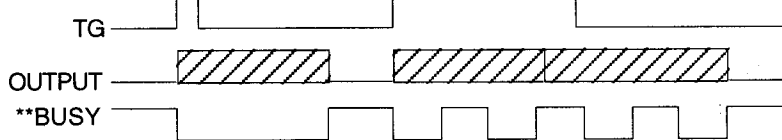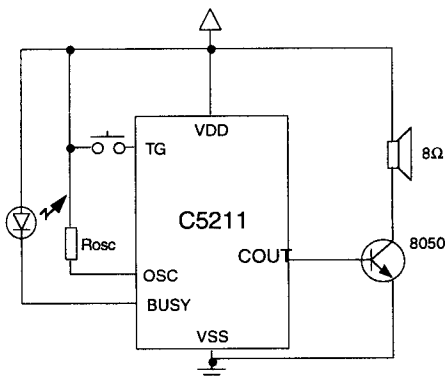


(C) Edge Retrigger



## (3) BUSY

BUSY signal is active during operation.



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** During play,BUSY keeps low to drive LED lighting or
   BUSY outputs pulses to drive LED blinking
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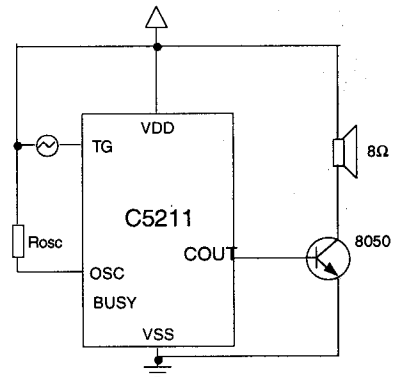
## APPLICATION ENVIRONMENT

### (1) BASIC APPLICATION



D/A converter loudspeaker output
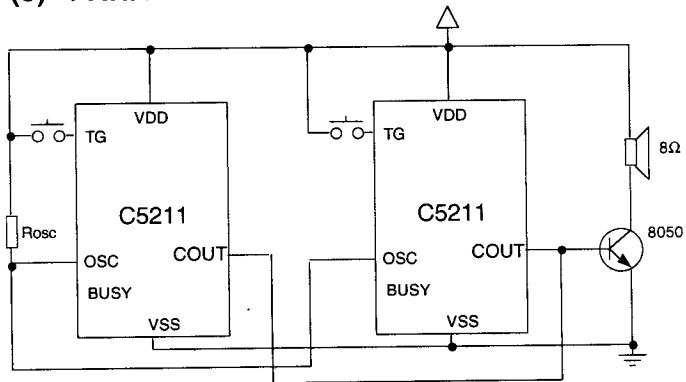with BUSY driving LED blinking

### (2) Cds TRIGGER APPLICATION



Support Cds input trigger.

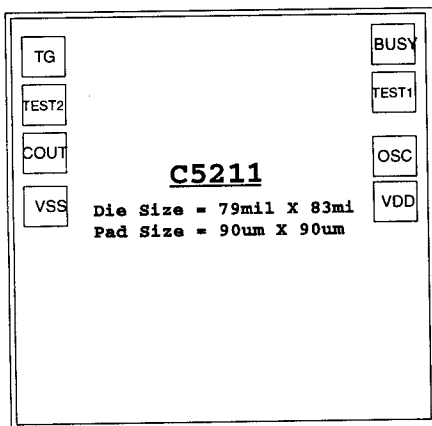Note : The value of Rosc for different sampling frequency is suggested as below :

| VDD | Sampling frequency | Rosc |
|-----|--------------------|------|
| 3V | 6KHZ | 220K |
| 3V | 7.5KHZ | 170K |
| 3V | 9.0KHZ | 130K |

## (3) PARALLEL APPLICATION



Parallel application with loudspeaker output

## PAD DIAGRAM



Note : Substrate should be connected to Vss